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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/938,435	08/23/2001	Tae Kyung Won	5336/DISPLAY/AKT/BG	2581

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

PAULRAJ, CHRISTOPHER

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 11/06/2002

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/938,435

Applicant(s)

WON ET AL.

Examiner

Christopher G. Paulraj

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

1. Note: The claims, as originally filed were misnumbered because they omitted claim number 19. Original claim 20-25 have been correspondingly renumbered as claims 19-24. The following action refers to the renumbered claims.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim ¹²~~8~~ is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim requires that the TEOS is inputted at about 300 sccm into the PECVD chamber. However, since neither the claim nor the specification indicate the concentration of the TEOS within the gas to be deposited, one skilled in the art would not be able to make or use the claimed invention. One skilled in the art would recognize that the thickness of any film formed by a CVD or PECVD process at a particular deposition rate is critically dependant upon the concentration of the component to be deposited within the gas. Since this is not disclosed in the present application, one skilled in the art would have to undergo "undue experimentation" to make and use the claimed invention. There are several factors considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue." See MPEP 2164.01(a). The state of the prior

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art shows that the concentration of TEOS used in a CVD or PECVD process can significantly vary (See Lin et al., U.S. Patent No. 6,143,666, col. 8, lines 1-10). The nature of the invention requires that a specific concentration be used in order to satisfy the film uniformity requirement. There is an insufficient amount of direction provided by the inventor to determine the appropriate concentration in the present case.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 14-20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially uniform thin" in claims 14-20 is a relative term which renders the claim indefinite. The term "substantially uniform thin" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

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6. Claims 14-18, 20-22, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Goto et al. (U.S. Patent 6,451,390).

Goto et al. discloses silicon dioxide films having a film uniformity of less than 10% formed by depositing a TEOS precursor on a large substrate using a PECVD process (col. 5, lines 15-30, Tables 1-2, Fig. 6b). The film can be thinner or thicker than 300Å (col. 3, lines 51-53). The film can be used in flat panel displays (col. 1, lines 48-49).

7. Claims 14-18, 20-22, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Ko (U.S. Patent 6,427,623).

Ko also discloses silicon dioxide films having a film uniformity of less than 10% formed by depositing a TEOS precursor on a large substrate using a PECVD process (col. 1, lines 29-31, col. 4, lines 33-38). The films can be used in large liquid crystal displays (col. 2, lines 64-65).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Patent No. 6,143,666) in view of Cook et al. (U.S. Patent No. 6,352,594), Ekbundit et al. (2002 IEEE/SEMI Advanced Semiconductor Manufacturing Conference), Lee et al.

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(IEEE Transactions on Semiconductor Manufacturing, vol. 12, no. 3, 340), Machado et al. (U.S. Patent No. 5,098,865), and Beer et al. (U.S. Patent No. 6,225,601).

Lin et al. discloses a plasma surface treatment method, which can be used to fabricate flat panel display microelectronic fabrications (col. 5, lines 49-50), that comprises depositing a TEOS precursor onto a substrate using a CVD method (col. 7, lines 42-45). The substrate temperature can be from about 350 to about 550 °C for a thermal CVD method and from about 350 to about 450 °C for a PECVD method (col. 7, lines 63-67). The CVD method also preferably employs a radio frequency power of from about 600 to about 900 watts at a radio frequency of 13.56 MHz (col. 7, lines 61-63), an oxygen flow rate of from 400 to about 8000 sccm (col. 8, lines 12-15), and a background helium flow rate of from about 3500 to about 4500 sccm for a SACVD method (col. 8, lines 15-25). Lin et al. does not specifically disclose a method of controlling the temperature of the perimeter and the inside surface to within the claimed ranges. Neither does Lin et al. disclose that the deposited organosilicate film should have a film uniformity of less than or equal to about 10%.

Cook et al. discloses a method for improved CVD process where various materials can be deposited onto a semiconductor wafer or flat panel display substrate to obtain a thin film having thickness uniformity (col. 1, lines 20-45).

Ekbundit et al. (abstract), Lee et al. (abstract, page 1, col. 2), and Machado et al. (col. 2, lines 29-41), each disclose that deposition and substrate temperatures variations in a CVD process can affect the film thickness and uniformity of a organosilicate film that is formed from such a process.

Beer et al. discloses a method which comprises controlling the temperature of the periphery of a large substrate and an inside portion thereof to produce a uniform temperature across the substrate (abstract, col. 50-65).

In light of the teachings of the above references, one skilled in the art would have found it obvious to control the temperature of the periphery and the inside portion of a large substrate in the CVD process similar to that disclosed by Lin et al. The motivation for doing so would have been to obtain a film of organosilicate having uniform thickness. In the absence of establishing criticality or unexpected results, one skilled in the art would have found it obvious to optimize the temperatures of the periphery and the inside portion of the substrate to obtain film uniformity. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). One skilled in the art would also have found it obvious to adjust the time of deposition for about one minute. The motivation for doing so would have been to optimize the thickness of the deposited film.

10. Claims 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto et al. and Ko.

Goto et al. and Ko do not specifically disclose that the film formed can have a thickness of about 1000Å. However, in the absence of establishing criticality or unexpected results, one skilled in the art would have found it obvious to adjust the thickness of the

silicon dioxide layers to about 1000Å. The motivation for doing so would have been to optimize the physical and chemical properties of the formed film.

Information Disclosure Statement

11. Receipt of Information Disclosure Statement filed on August 23, 2001 is acknowledged and has been made of record. Foreign language documents were only considered to the extent of what their English abstracts provided.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher G. Paulraj whose telephone number is (703) 308-1036. The examiner can normally be reached on Monday-Friday, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.

cgp
November 3, 2002


D. S. NAKARANI
PRIMARY EXAMINER, Acting SPE